

**IN THE CLAIMS:**

1. (Currently Amended) A method for fabricating a thin film transistor, comprising:

- forming a first amorphous semiconductor film;
- forming a material including a metal element to promote crystallization over the first amorphous semiconductor film;
- ~~forming a first crystalline semiconductor film by~~ heating the first amorphous semiconductor film to form a first crystalline semiconductor film;
- forming a second amorphous semiconductor film over the first crystalline semiconductor film;
- heating the first crystalline semiconductor film and the second amorphous semiconductor film;
- removing the second amorphous semiconductor film; and
- wherein the second amorphous semiconductor film ~~contains~~ comprises nitrogen at a concentration of [[is]]  $1 \times 10^{18}$  atoms/cm<sup>3</sup> or lower, oxygen at a concentration of [[is]]  $8 \times 10^{19}$  atoms/cm<sup>3</sup> or lower, and noble gas at a concentration of [[is]]  $1 \times 10^{20}$  atoms/cm<sup>3</sup> or higher.

2. (Original) A method for fabricating a thin film transistor, comprising:

- forming a first amorphous semiconductor film;
- forming a material including a metal element to promote crystallization over the first amorphous semiconductor film;
- forming a first crystalline semiconductor film by heating the first amorphous semiconductor film;
- irradiating the first crystalline semiconductor film with a laser beam;
- forming a second amorphous semiconductor film over the first crystalline semiconductor film;
- heating the first crystalline semiconductor film and the second amorphous semiconductor film;
- removing the second amorphous semiconductor film; and

wherein the amorphous semiconductor film contains nitrogen concentration is  $1 \times 10^{18}$  atoms/cm<sup>3</sup> or lower, oxygen concentration is  $8 \times 10^{19}$  atoms/cm<sup>3</sup> or lower, and noble gas concentration is  $1 \times 10^{20}$  atoms/cm<sup>3</sup> or higher.

3. (Currently Amended) A method for fabricating a thin film transistor, comprising:

forming a first amorphous semiconductor film;

forming a material including a metal element to promote crystallization over the first amorphous semiconductor film;

~~forming a first crystalline semiconductor film by heating the first amorphous semiconductor film to form a first crystalline semiconductor film;~~

forming a second amorphous semiconductor film over the first crystalline semiconductor film;

heating the first crystalline semiconductor film and the second amorphous semiconductor film;

removing the second amorphous semiconductor film; and

wherein the second amorphous semiconductor film ~~contains~~ comprises nitrogen at a concentration of ~~of~~ [[is]]  $1 \times 10^{18}$  atoms/cm<sup>3</sup> or lower, oxygen at a concentration of ~~of~~ [[is]]  $8 \times 10^{19}$  atoms/cm<sup>3</sup> or lower, and noble gas at a concentration of ~~of~~ [[is]]  $1 \times 10^{20}$  atoms/cm<sup>3</sup> or higher.

4. (Original) A method for fabricating a thin film transistor, comprising:

forming a first amorphous semiconductor film;

forming a material including a metal element to promote crystallization over the first amorphous semiconductor film;

forming a first crystalline semiconductor film by heating the first amorphous semiconductor film;

forming a second amorphous semiconductor film over the first crystalline semiconductor film;

moving the metal element into the second amorphous semiconductor film by heating the first crystalline semiconductor film and the second amorphous semiconductor film;

removing the second amorphous semiconductor film; and  
wherein the second amorphous semiconductor film contains nitrogen concentration is  $1 \times 10^{18}$  atoms/cm<sup>3</sup> or lower, oxygen concentration is  $8 \times 10^{19}$  atoms/cm<sup>3</sup> or lower, and noble gas concentration is  $1 \times 10^{20}$  atoms/cm<sup>3</sup> or higher.

5. (Original) A method for fabricating a thin film transistor, comprising:  
forming a first amorphous semiconductor film;  
forming a material including a metal element to promote crystallization over the first amorphous semiconductor film;  
forming a first crystalline semiconductor film by heating the first amorphous semiconductor film;  
forming a second amorphous semiconductor film over the first crystalline semiconductor film;  
performing gettering by heating the first crystalline semiconductor film and the second amorphous semiconductor film;  
removing the second amorphous semiconductor film; and  
wherein the amorphous semiconductor film contains nitrogen concentration is  $1 \times 10^{18}$  atoms/cm<sup>3</sup> or lower, oxygen concentration is  $8 \times 10^{19}$  atoms/cm<sup>3</sup> or lower, and noble gas concentration is  $1 \times 10^{20}$  atoms/cm<sup>3</sup> or higher.

6. (Original) A method for fabricating a thin film transistor, comprising:  
forming a first amorphous semiconductor film;  
forming a material including a metal element to promote crystallization over the first amorphous semiconductor film;  
forming a first crystalline semiconductor film by heating the first amorphous semiconductor film;  
forming a barrier film over the first crystalline semiconductor film;  
forming a second amorphous semiconductor film over the barrier film;  
heating the first crystalline semiconductor film and the second amorphous semiconductor film;  
removing the second amorphous semiconductor film and the barrier film, and

wherein the second amorphous semiconductor film contains nitrogen concentration is  $1 \times 10^{18}$  atoms/cm<sup>3</sup> or lower, oxygen concentration is  $8 \times 10^{19}$  atoms/cm<sup>3</sup> or lower, and noble gas concentration is  $1 \times 10^{20}$  atoms/cm<sup>3</sup> or higher.

7. (Original) A method for fabricating a thin film transistor according to Claim 6, wherein the barrier film is an oxide film made by using ozone water or a mixed solution of hydrogen peroxide solution and sulfuric acid, hydrochloric acid or nitric acid.
8. (Original) A method for fabricating a thin film transistor according to claim 1, wherein the second amorphous semiconductor film is formed by sputtering.
9. (Original) A method for fabricating a thin film transistor according to claim 2, wherein the second amorphous semiconductor film is formed by sputtering.
10. (Original) A method for fabricating a thin film transistor according to claim 3, wherein the second amorphous semiconductor film is formed by sputtering.
11. (Original) A method for fabricating a thin film transistor according to claim 4, wherein the second amorphous semiconductor film is formed by sputtering.
12. (Original) A method for fabricating a thin film transistor according to claim 5, wherein the second amorphous semiconductor film is formed by sputtering.
13. (Original) A method for fabricating a thin film transistor according to claim 6, wherein the second amorphous semiconductor film is formed by sputtering.
14. (Original) A method for fabricating a thin film transistor, comprising:  
forming a first amorphous semiconductor film;  
forming a material including a metal element to promote crystallization over the first amorphous semiconductor film;

forming a first crystalline semiconductor film by heating the first amorphous semiconductor film;

forming a second amorphous semiconductor film over the first crystalline semiconductor film;

heating the first crystalline semiconductor film and the second amorphous semiconductor film;

removing the second amorphous semiconductor film;

wherein the second amorphous semiconductor film is formed by sputtering in a state in which a flammable gas and a noble gas are supplied to a film formation chamber, oxygen concentration in the film formation chamber is reduced, and the supply of the flammable gas is stopped; and

wherein the second amorphous semiconductor film contains nitrogen concentration is  $1 \times 10^{18}$  atoms/cm<sup>3</sup> or lower, oxygen concentration is  $8 \times 10^{19}$  atoms/cm<sup>3</sup> or lower, and noble gas concentration is  $1 \times 10^{20}$  atoms/cm<sup>3</sup> or higher.

15. (Original) A method for fabricating a thin film transistor according to Claim 14,

wherein the flammable gas is one element or more elements selected from a group consisting of SiH<sub>4</sub>, Si<sub>2</sub>H<sub>6</sub>, SiH<sub>2</sub>CL<sub>2</sub>, SiHC1<sub>3</sub>, SiC1<sub>4</sub>, GeH<sub>4</sub>, PH<sub>3</sub>, B<sub>2</sub>H<sub>6</sub>, AsH<sub>3</sub>, and H<sub>2</sub>Se.

16. (Original) A method for fabricating a thin film transistor, comprising:

forming a first amorphous semiconductor film;

forming a material including a metal element to promote crystallization over the first amorphous semiconductor film;

forming a first crystalline semiconductor film by heating the first amorphous semiconductor film;

forming a second amorphous semiconductor film over the first crystalline semiconductor film;

heating the first crystalline semiconductor film and the second amorphous semiconductor film;

removing the second amorphous semiconductor film;

wherein the second amorphous semiconductor film is formed by sputtering in a state in which a filament including Ti that is disposed in a film formation chamber is heated, oxygen concentration in the film formation chamber is reduced, and the heating of the filament is stopped; and

wherein the second amorphous semiconductor film contains nitrogen concentration is  $1 \times 10^{18}$  atoms/cm<sup>3</sup> or lower, oxygen concentration is  $8 \times 10^{19}$  atoms/cm<sup>3</sup> or lower, and noble gas concentration is  $1 \times 10^{20}$  atoms/cm<sup>3</sup> or higher.

17. (Original) A method for fabricating a thin film transistor, comprising:
- forming a first amorphous semiconductor film;
  - forming a material including a metal element to promote crystallization over the first amorphous semiconductor film;
  - forming a first crystalline semiconductor film by heating the first amorphous semiconductor film;
  - forming a second amorphous semiconductor film over the first crystalline semiconductor film;
  - heating the first crystalline semiconductor film and the second amorphous semiconductor film;
  - removing the second amorphous semiconductor film;
  - wherein the second amorphous semiconductor film is formed by sputtering in a state in which a voltage is applied between electrodes including Ti disposed in a film formation chamber to generate a plasma, oxygen concentration in the film formation chamber is reduced, and applying the voltage between the electrodes is stopped; and
  - wherein the second amorphous semiconductor film contains nitrogen concentration is  $1 \times 10^{18}$  atoms/cm<sup>3</sup> or lower, oxygen concentration is  $8 \times 10^{19}$  atoms/cm<sup>3</sup> or lower, and noble gas concentration is  $1 \times 10^{20}$  atoms/cm<sup>3</sup> or higher.

18. (Original) A method for fabricating a thin film transistor according to claim 1, wherein the second amorphous semiconductor film is removed by dry etching using hydrazine or tetramethyl ammonium hydroxide.

19. (Original) A method for fabricating a thin film transistor according to claim 2, wherein the second amorphous semiconductor film is removed by dry etching using hydrazine or tetramethyl ammonium hydroxide.

20. (Original) A method for fabricating a thin film transistor according to claim 3, wherein the second amorphous semiconductor film is removed by dry etching using hydrazine or tetramethyl ammonium hydroxide.

21. (Original) A method for fabricating a thin film transistor according to claim 4, wherein the second amorphous semiconductor film is removed by dry etching using hydrazine or tetramethyl ammonium hydroxide.

22. (Original) A method for fabricating a thin film transistor according to claim 5, wherein the second amorphous semiconductor film is removed by dry etching using hydrazine or tetramethyl ammonium hydroxide.

23. (Original) A method for fabricating a thin film transistor according to claim 6, wherein the second amorphous semiconductor film is removed by dry etching using hydrazine or tetramethyl ammonium hydroxide.

24. (Original) A method for fabricating a thin film transistor according to claim 14, wherein the second amorphous semiconductor film is removed by dry etching using hydrazine or tetramethyl ammonium hydroxide.

25. (Original) A method for fabricating a thin film transistor according to claim 16, wherein the second amorphous semiconductor film is removed by dry etching using hydrazine or tetramethyl ammonium hydroxide.

26. (Original) A method for fabricating a thin film transistor according to claim 17,

wherein the second amorphous semiconductor film is removed by dry etching using hydrazine or tetramethyl ammonium hydroxide.

27. (Original) A method for fabricating a thin film transistor according to claim 1, wherein the noble gas element is one element or more elements selected from a group consisting of helium (He), neon (Ne), argon (Ar), krypton (Kr), and xenon (Xe).

28. (Original) A method for fabricating a thin film transistor according to claim 2, wherein the noble gas element is one element or more elements selected from a group consisting of helium (He), neon (Ne), argon (Ar), krypton (Kr), and xenon (Xe).

29. (Original) A method for fabricating a thin film transistor according to claim 3, wherein the noble gas element is one element or more elements selected from a group consisting of helium (He), neon (Ne), argon (Ar), krypton (Kr), and xenon (Xe).

30. (Original) A method for fabricating a thin film transistor according to claim 4, wherein the noble gas element is one element or more elements selected from a group consisting of: helium (He), neon (Ne), argon (Ar), krypton (Kr), and xenon (Xe).

31. (Original) A method for fabricating a thin film transistor according to claim 5, wherein the noble gas element is one element or more elements selected from a group consisting of helium (He), neon (Ne), argon (Ar), krypton (Kr), and xenon (Xe).

32. (Original) A method for fabricating a thin film transistor according to claim 6, wherein the noble gas element is one element or more elements selected from a group consisting of helium (He), neon (Ne), argon (Ar), krypton (Kr), and xenon (Xe).

33. (Original) A method for fabricating a thin film transistor according to claim 14, wherein the noble gas element is one element or more elements selected from a group consisting of helium (He), neon (Ne), argon (Ar), krypton (Kr), and xenon (Xe).



34. (Original) A method for fabricating a thin film transistor according to claim 16,  
wherein the noble gas element is one element or more elements selected from a group consisting of helium (He), neon (Ne), argon (Ar), krypton (Kr), and xenon (Xe).
35. (Original) A method for fabricating a thin film transistor according to claim 17,  
wherein the noble gas element is one element or more elements selected from a group consisting of helium (He), neon (Ne), argon (Ar), krypton (Kr), and xenon (Xe).
36. (Original) A method for fabricating a thin film transistor according to claim 1,  
wherein the metal element is one element or more elements selected from a group consisting of iron (Fe), nickel (Ni), cobalt (Co), ruthenium (Ru), rhodium (Rh), palladium (Pd), osmium (Os), iridium (Ir), platinum (Pt), copper (Cu), and gold (Au).
37. (Original) A method for fabricating a thin film transistor according to claim 2,  
wherein the metal element is one element or more elements selected from a group consisting of iron (Fe), nickel (Ni), cobalt (Co), ruthenium (Ru), rhodium (Rh), palladium (Pd), osmium (Os), iridium (Ir), platinum (Pt), copper (Cu), and gold (Au).
38. (Original) A method for fabricating a thin film transistor according to claim 3,  
wherein the metal element is one element or more elements selected from a group consisting of iron (Fe), nickel (Ni), cobalt (Co), ruthenium (Ru), rhodium (Rh), palladium (Pd), osmium (Os), iridium (Ir), platinum (Pt), copper (Cu), and gold (Au).
39. (Original) A method for fabricating a thin film transistor according to claim 4,  
wherein the metal element is one element or more elements selected from a group consisting of iron (Fe), nickel (Ni), cobalt (Co), ruthenium (Ru), rhodium (Rh), palladium (Pd), osmium (Os), iridium (Ti), platinum (Pt), copper (Cu), and gold (Au).
40. (Original) A method for fabricating a thin film transistor according to claim 5,

wherein the metal element is one element or more elements selected from a group consisting of iron (Fe), nickel (Ni), cobalt (Co), ruthenium (Ru), rhodium (Rh), palladium (Pd), osmium (Os), iridium (Ir), platinum (Pt), copper (Cu), and gold (Au).

41. (Original) A method for fabricating a thin film transistor according to claim 6, wherein the metal element is one element or more elements selected from a group consisting of iron (Fe), nickel (Ni), cobalt (Co), ruthenium (Ru), rhodium (Rh), palladium (Pd), osmium (Os), iridium (Ir), platinum (Pt), copper (Cu), and gold (Au).

42. (Original) A method for fabricating a thin film transistor according to claim 14, wherein the metal element is one element or more elements selected from a group consisting of iron (Fe), nickel (Ni), cobalt (Co), ruthenium (Ru), rhodium (Rh), palladium (Pd), osmium (Os), iridium (Ir), platinum (Pt), copper (Cu), and gold (Au)

43. (Original) A method for fabricating a thin film transistor according to claim 16, wherein the metal element is one element or more elements selected from a group consisting of iron (Fe), nickel (Ni), cobalt (Co), ruthenium (Ru), rhodium (Rh), palladium (Pd), osmium (Os), iridium (Ti), platinum (Pt), copper (Cu), and gold (Au)

44. (Original) A method for fabricating a thin film transistor according to claim 17, wherein the metal element is one element or more elements selected from a group consisting of iron (Fe), nickel (Ni), cobalt (Co), ruthenium (Ru), rhodium (Rh), palladium (Pd), osmium (Os), iridium (Ir), platinum (Pt), copper (Cu), and gold (Au).